

Claims

1. A method to assess therapeutic levels of S-adenosylmethionine (SAM) in a biological fluid sample which method comprises
- 5 providing said sample with glycine N-methyltransferase (GMT), a S-adenosyl homocysteine hydrolase (SAHH) or His•SAHH, and glycine; and
- measuring one or more reaction products in said sample wherein the level(s) of said one or more reaction products is directly proportional to the level of SAM in the sample.
- 10 2. The method of claim 1 wherein the product detected is homocysteine (HC).
3. The method of claim 2 wherein said HC is measured by a method which comprises treating the sample with homocysteinase (HCYase) and measuring the concentration of at least one product obtained by the reaction of HCYase with said
- 15 homocysteine.
4. The method of claim 3 wherein the product measured is H₂S.
5. The method of claim 4 wherein said H₂S is measured by fluorescence or is measured by absorbance.
6. The method of claim 1, wherein the SAHH comprises an amino acid
- 20 sequence encoded by SEQ ID NO:1.
7. A kit for assaying a sample containing SAM, the kit comprising SAHH or His•SAHH, GMT, glycine and instructions for use.

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8. An assay comprising:
a biological sample containing SAM; and
GMT, glycine, and SAHH or His•SAHH,
wherein SAHH or His•SAHH activity results in a product that is capable of being
5 measured to determine the amount of SAM in the sample.

9. An isolated nucleic acid molecule comprising SEQ ID NO:1.
10. The nucleic acid molecule defined in claim 9 further comprising a
sequence for coding a 6 x His Tag at the N-terminus.

11. A method for efficient production of S-adenosyl homocysteine hydrolase
10 which method comprises expressing a cassette comprising the nucleic acid molecule
defined in claim 9.

12. A method for efficient production of His•S-adenosyl homocysteine
hydrolase which method comprises expressing a cassette comprising the nucleic acid
15 molecule defined in claim 10.

13. The method of claim 11 wherein said cassette is expressed in *E. coli*.

14. The method of claim 12 wherein said cassette is expressed in *E. coli*.
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15. A method of purifying His•S-adenosyl homocysteine hydrolase
comprising:

precipitating a suspension containing the His•S-adenosyl homocysteine hydrolase
produced by the method of claim 12 with ammonium sulfate to produce a supernatant and
25 a precipitate; and

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subjecting the supernatant to His Tag recognizing affinity chromatography.

~~16.~~ A method of purifying His•S-adenosyl homocysteine hydrolase with a single chromatography step comprising

5 subjecting the His•S-adenosyl homocysteine hydrolase produced by the method of claim 12 with to Ni-NAT affinity chromatography.

10 17. A method of measuring homocysteine in a biological fluid comprising contacting said fluid with a His•S-adenosyl homocysteine hydrolase produced by the method of claim 15 and measuring the homocysteine to SAH conversion in said fluid.

15 18. A composition comprising His•S-adenosyl homocysteine hydrolase which yields a single band upon analysis by SDS polyacrylamide gel electrophoresis wherein said His•S-adenosyl homocysteine hydrolase is prepared by the method of claim 15.

20 19. A method of depleting excess homocysteine in a biological fluid *in vivo* or *ex vivo* comprising contacting said fluid with a SAHH produced by the method of claim 15.

20 20. An *E. coli* host cell which comprising the nucleic acid molecule of claim 9.

20 21. An *E. coli* host cell which comprising the nucleic acid molecule of claim 10.